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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
MUTSCHLER, BRIAN L

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 05/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/744,465	STEENKISTE ET AL.	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- Th MAILING DATE of this communication app ars on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-6 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-6 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 16 April 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:
It does not identify the citizenship of each inventor.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the conductive pattern must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: dicing line **1** (see page 5, line 5) and sealing means **6** (see page 5, line 13). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings do not clearly illustrate the features recited in the instant claims and in the disclosure. Several features in the drawings are not identified by reference

characters, especially Figures 1, 3, 4 and 5; no features were identified in Figure 5. It is unclear how Figure 4 relates to the described invention because it does not identify the substrate, the conductive pattern, and how the electrical contacts are made between the various features.

Specification

5. The abstract of the disclosure is objected to because it contains legal phraseology, e.g., "said first surface". Correction is required. See MPEP § 608.01(b).

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

7. The disclosure is objected to because of the following informalities:

a. The phrase "temporary electrically connected", first appearing on page 4 at line 3, and all subsequent occurrences of the phrase, should be changed to --temporarily electrically connected--.

b. The specification should identify elements corresponding to the features labeled in the drawings by their appropriate reference character, e.g., dicing line **1**.

Appropriate correction is required.

Claim Objections

8. Claims 1, 3 and 4 are objected to because of the following informalities:

a. In claim 1 at line 11, please change the phrase "thereby inhibiting exposure" to either --and inhibiting exposure-- or --inhibiting exposure--. The current phrasing using the term "thereby" appears to imply that the inhibition of exposure is caused by the step of applying the plating solution, which is not consistent with the seal and physical contact means of inhibiting exposure as disclosed in the specification.

b. A period "." should be inserted at the end of claim 3.

c. In claim 4 at line 4, please change "an" to --and--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "said electrode and said conductive pattern are temporarily electrically connected by forming a polysilicon or an amorphous silicon conductor contact to the substrate... and by providing an electrical connection between said contact and said electrode" in lines 13-20. This limitation is indefinite because the relationship between the various electrical connections is not clear from the claim language in light of the specification. First, the specification describes the substrate as "a piece of a conductive material or a doped semi-conductive material", both of which are conductive materials (see page 7, lines 16-17). Based on the definition of the substrate, how are the electrode and conductive pattern "temporarily electrically connected by forming a polysilicon or an amorphous silicon conductor to temporarily connect said conductive pattern with a contact to the substrate"? If the substrate is conductive and is in contact with the electrode, as recited in lines 5-9, and the conductive pattern is "on a surface of [the] substrate", how does the silicon conductor "temporarily electrically connect the electrode and the conductive pattern? It appears that the substrate, being a conductive material, and the conductive pattern, being on a surface of the substrate, would already be in electrical contact. Furthermore, in lines 7-9, it states, "said substrate is in contact with said electrode and said conductive pattern and said conductive pattern is temporarily electrically connected to said electrode". It is suggested that the relationship between the different elements be clarified. The same applies to dependent claims 2-5.

Claim 6 recites the limitation "said conductive pattern being temporarily electrically connected" in lines 9-10. The term "temporarily" implies a transient

condition, which is indefinite in terms of the structure of a device. The conductive pattern either is or is not connected by a silicon conductor. For the purpose of examination, the claim will be interpreted to include the conductive pattern electrically connected to a silicon conductor.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth et al. (U.S. Pat. No. 5,726,075) in view of Akram et al. (U.S. Pat. No. 5,483,741) and in view of Schuster et al. (U.S. Pat. No. 5,000,827).

Farnworth et al. disclose a method for plating on a conductive pattern on a surface of a substrate wherein the substrate **14A** has a first surface and a second surface (figs. 4 and 5; col. 6, lines 30-41). The substrate **14** can comprise silicon or metal (col. 3, lines 37-44). Metal layer **32** comprises a conductive pattern **22A** made of metal on a surface of the substrate **14A**, connected to metal bus bars (contacts) **40** via metal connecting segments **42** (figs. 3A, 4 and 5; col. 5, lines 10-22). Plating of microbumps **12A** occurs using the conductive pattern **22A**, connecting segments **42** and bus bars **40** while contacting the surface of the substrate **14A** with a plating solution (col. 5, line 63 to col. 6, line 10). Connecting segments **42** are used to form a temporary

electrical connection between the bus bars (contacts) **40** and the conductive pattern **22A**, wherein after plating, the connecting segments **42** on the substrate **14A** are severed by sawing or scribing (col. 6, lines 55-56).

Regarding claims 2 and 3, the conductive pattern **22A** is positioned on a first area (first die) that is severed from the contacts **40**, positioned on a second area (second die), after plating (col. 6, lines 55-56).

Regarding claim 4, Farnworth et al. teach the masking of exposed conductive portions to prevent unwanted plating on those portions (col. 6, lines 7-10).

Regarding claim 5, Farnworth et al. discloses that suitable metals for forming the microbumps **12** include Ni, Au, Cu and Pd. (col. 4, lines 24-25). Since the microbumps **12** are formed by electroplating in an electroplating solution, the plating solution would contain one or more of those elements.

Regarding claim 6, Farnworth et al. disclose a substrate **14A** having a first surface and an opposing second surface, wherein the first surface has a conductive pattern **22A** and is exposable to a plating solution (figs. 3A, 4 and 5; col. 5, line 10 to col. 6, line 54). A contact in the form of bus bar **40** is connected to the first surface of the substrate **14A** (figs. 3A, 4 and 5). The conductive pattern **22A** is electrically connected to the bus bar **40** via connecting segments **42**, which are made of metal (figs. 3A and 4; col. 5, lines 10-22). As shown in Figure 5, the contact **40** is electrically connected to the substrate **14A**.

The method and substrate of Farnworth et al. differs from the instant invention because Farnworth et al. do not disclose the following:

a. The substrate is placed on an electrode that forms part of a holder and is in contact with the electrode and said conductive pattern is temporarily electrical connection with the electrode, as recited in claim 1.

b. The electrode and conductive pattern are temporarily electrically connected by forming a polysilicon or an amorphous silicon conductor to temporarily connect the conductive pattern with a contact of the substrate, as recited in claim 1.

c. The conductive pattern is electrically connected by a polysilicon or an amorphous silicon conductor with the contact, as recited in claim 6.

Regarding claim 1, Schuster et al. disclose a similar method for plating patterns on a conductive pattern on a substrate, wherein the substrate is subsequently diced (figs. 1, 2 and 7). In the method of Schuster et al., the substrate **3** is attached to a wafer carrier, which serves as the cathode **4**, or since the wafer **3** is conductive, the wafer itself can act as the cathode **4** (col. 2, lines 13-17). As shown in Figure 7, the substrate **3** is in contact with wafer contact **30** and supported by support members **51** (col. 4, lines 44-55). The plating solution only contacts the underside (first surface) of the substrate **3** (col. 4, lines 65-68). The plating method of Schuster et al. provides a uniform plating depth over all areas of the substrate **3** and avoids the "edge effect" common with the prior art electroplating techniques (fig. 8; col. 5, lines 1-6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Farnworth et al. to plate the

substrate by contacting the back of the supported substrate with an electrode and directing the plating solution to contact only the underside of the substrate as taught by Schuster et al. because the method of Schuster et al. allows a uniform thickness to be plated over the entire surface of the substrate and avoids the "edge effect" common with other prior art plating techniques.

Regarding claims 1 and 6, Akram et al. teach that conductive traces can be made using metals or by polysilicon (col. 8, lines 10-19).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the connecting members in the method and substrate of Farnworth et al. to use polysilicon instead of metal because Akram et al. teach that polysilicon and metals are equivalent materials for forming conductive traces.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

blm
May 20, 2003

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700